

Analysis of long-term water quality trends in a Northeastern Florida estuary system

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Abstract

- SWMP monitors water quality at Pine Island and Pellicer Creek
- **Is Pine Island experiencing eutrophication from urban run off?**

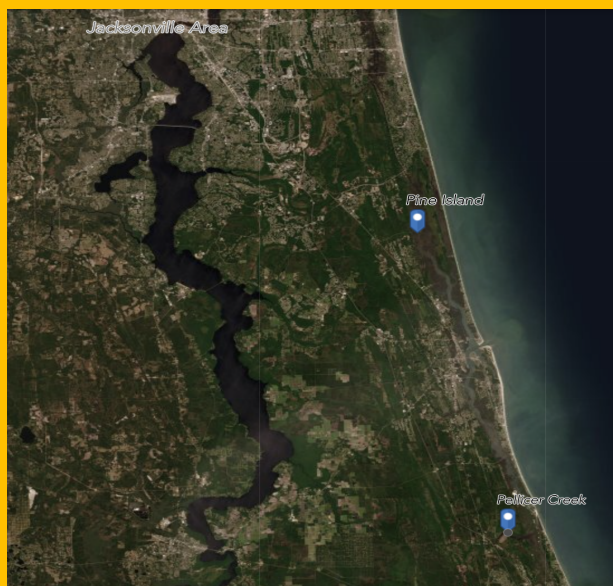


Figure 1. Geographic distribution of the study sites from ArcGIS Online

Methods

- Sites are comparable due to geographic situation
- Eutrophic conditions are indicated by high DIN, chlorophyll, and low salinity
- Data cleansing 1 million+ points
- Multiple regression analysis

Results

- Significant parameters: salinity, chlorophyll A, temperature
- Insignificant parameters: turbidity, PO_4^{3-} , dissolved O_2

Discussion

- Seasonal variation and nutrient cycling controls DIN at both sites
- Anthropogenic forcing doesn't influence nutrient levels in isolation

Pine Island

$$TDIN = -0.003 * Sal - 0.007 * ChlA + 0.014 * Temp - 0.11$$

Pellicer Creek

$$TDIN = -0.002 * Sal - 0.001 * ChlA + 0.001 * Temp + 0.06$$

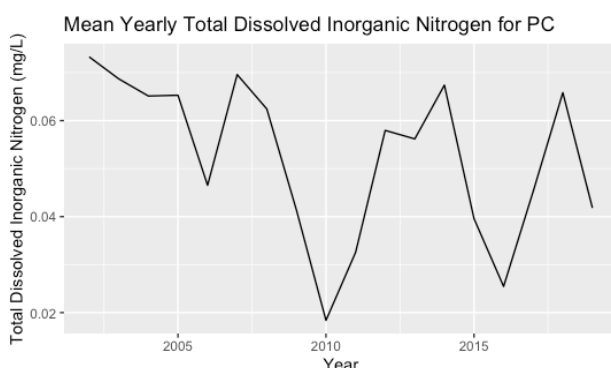
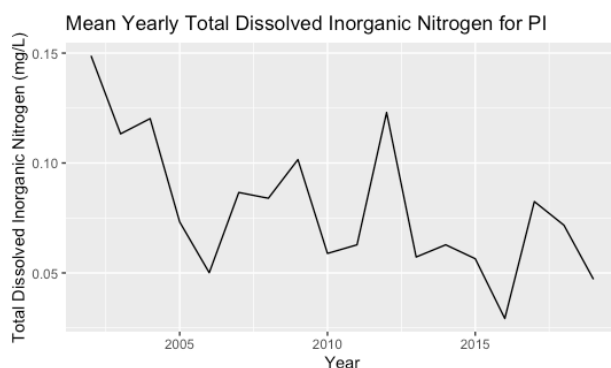


Figure 2. DIN decreases at Pine Island but remains constant at Pellicer Creek

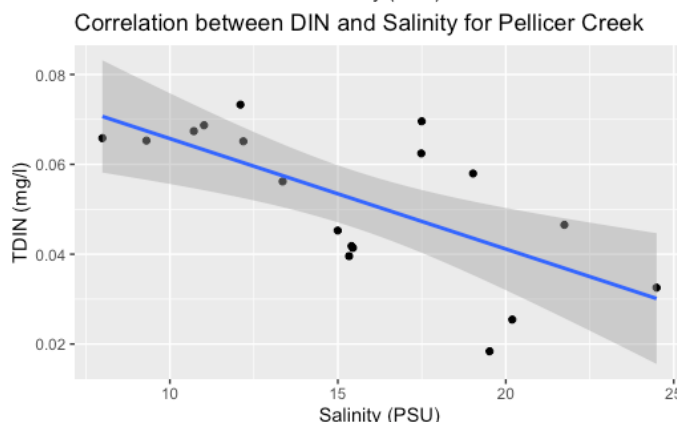
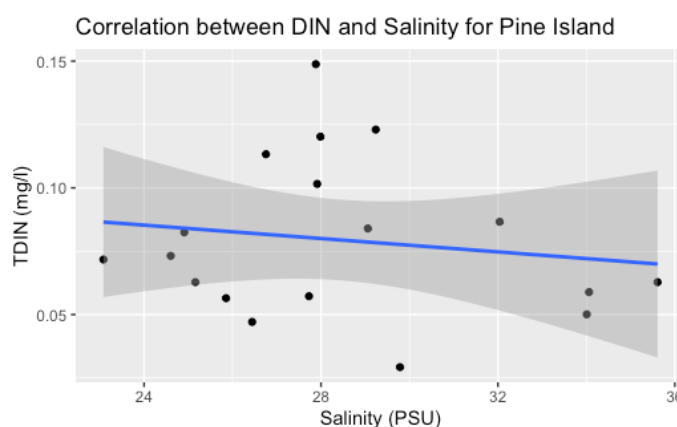


Figure 3. Relationship between DIN and salinity represents nutrients introduced via run off

Pine Island: $R^2 = 0.3368$

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.1112376	0.0902078	-1.233	0.218948
Mean_Sal	0.0031093	0.0031408	0.990	0.323351
Mean_CHLA_N	-0.0071508	0.0018658	-3.833	0.000169 ***
Mean_Temp	0.0143631	0.0036544	3.930	0.000116 ***
Mean_Sal:Mean_Temp	-0.0002948	0.0001266	-2.328	0.020895 *

Pellicer Creek: $R^2 = 0.2308$

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.0596631	0.0134799	4.426	1.56e-05 ***
Mean_Sal	-0.0019285	0.0003974	-4.853	2.40e-06 ***
Mean_CHLA_N	-0.0013896	0.0006227	-2.231	0.0267 *
Mean_Temp	0.0013863	0.0005471	2.534	0.0120 *

Figure 4. Chlorophyll controls DIN with greater significance at Pine Island

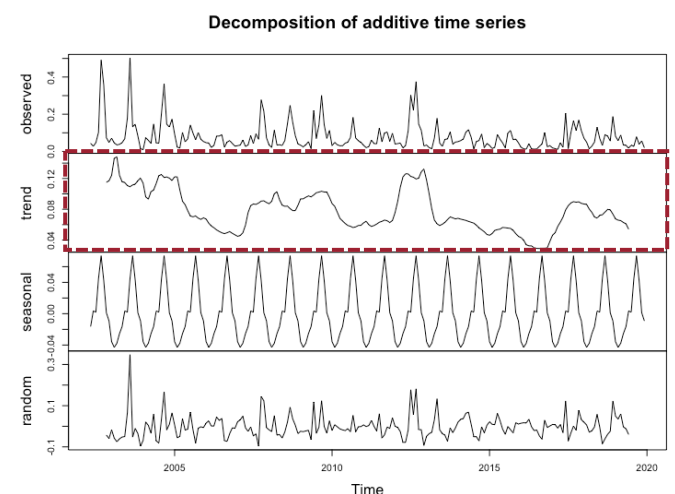


Figure 5. Time series for DIN at Pine Island suggest a negative trend

Conclusion

- Pine island is not experiencing eutrophication
- Apparent negative trend in DIN over time
- Higher range of salinity at Pine Island

Acknowledgements

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